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(56) Documents Cited

GB 2264613 A EP 0920170 A2 EP 0517237 A2  
WO 96/32783 A1 DE 019806430 A1

(58) Field of Search

UK CL (Edition R ) H3Q QBMA QBMX QLX QRDS, H4L  
LDA LECY LEUF  
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Online: WPI,EPODOC,PAJ

(54) Abstract Title

A long-wave or mobile phone adapter for a VHF FM car radio

(57) An FM modulator 8 converts LW or mobile phone signals into the VHF FM band. The VHF signal is coupled into the car radio aerial circuit by a diplexer 6 so that the LW or mobile phone signals may be received by the car radio. The diplexer 6 ensures that the signal at 5 is not radiated through the antenna 4. An RDS sub-carrier signal appropriate to the long wave signal may be impressed on the carrier output for decoding and display 11 in the vehicle radio. Alternatively, the RDS generator 9 may be supplied with a display data signal 10 from a radio telephone so that data relating to the telephone may be displayed on the vehicle radio display. The modulated signal may be supplied directly to a suitable stage in the receiver, or directly to the RDS decoder, preferably overriding any existing received signal.

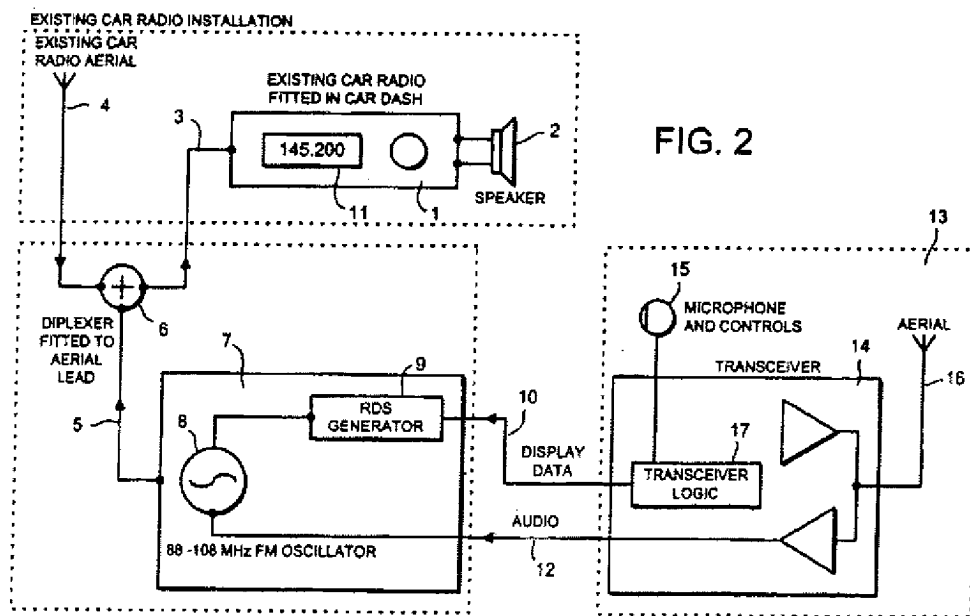


FIG. 2

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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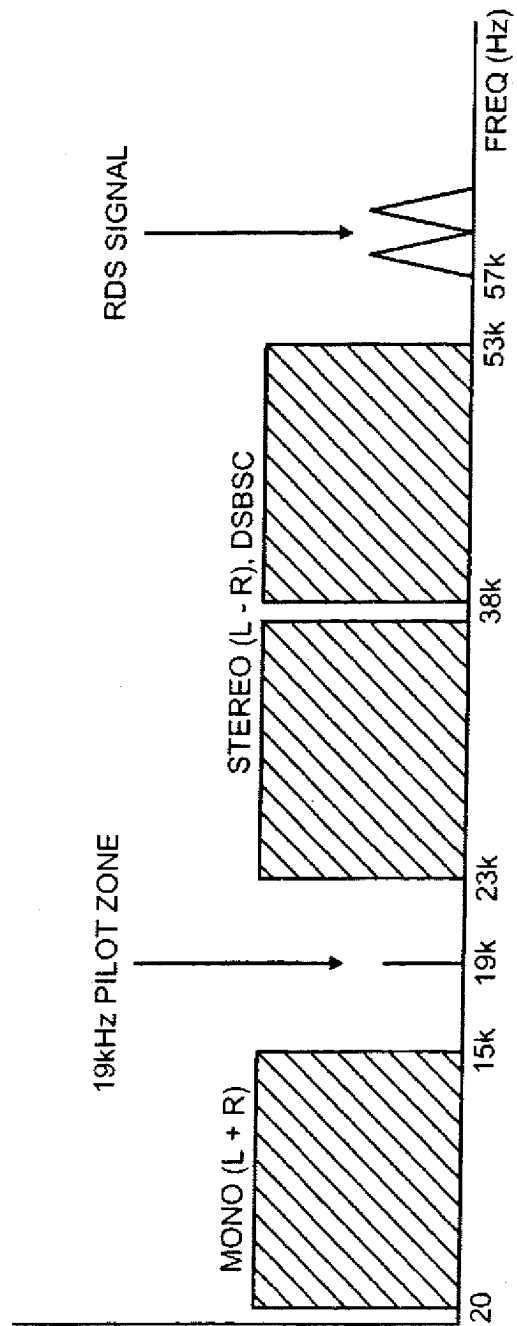
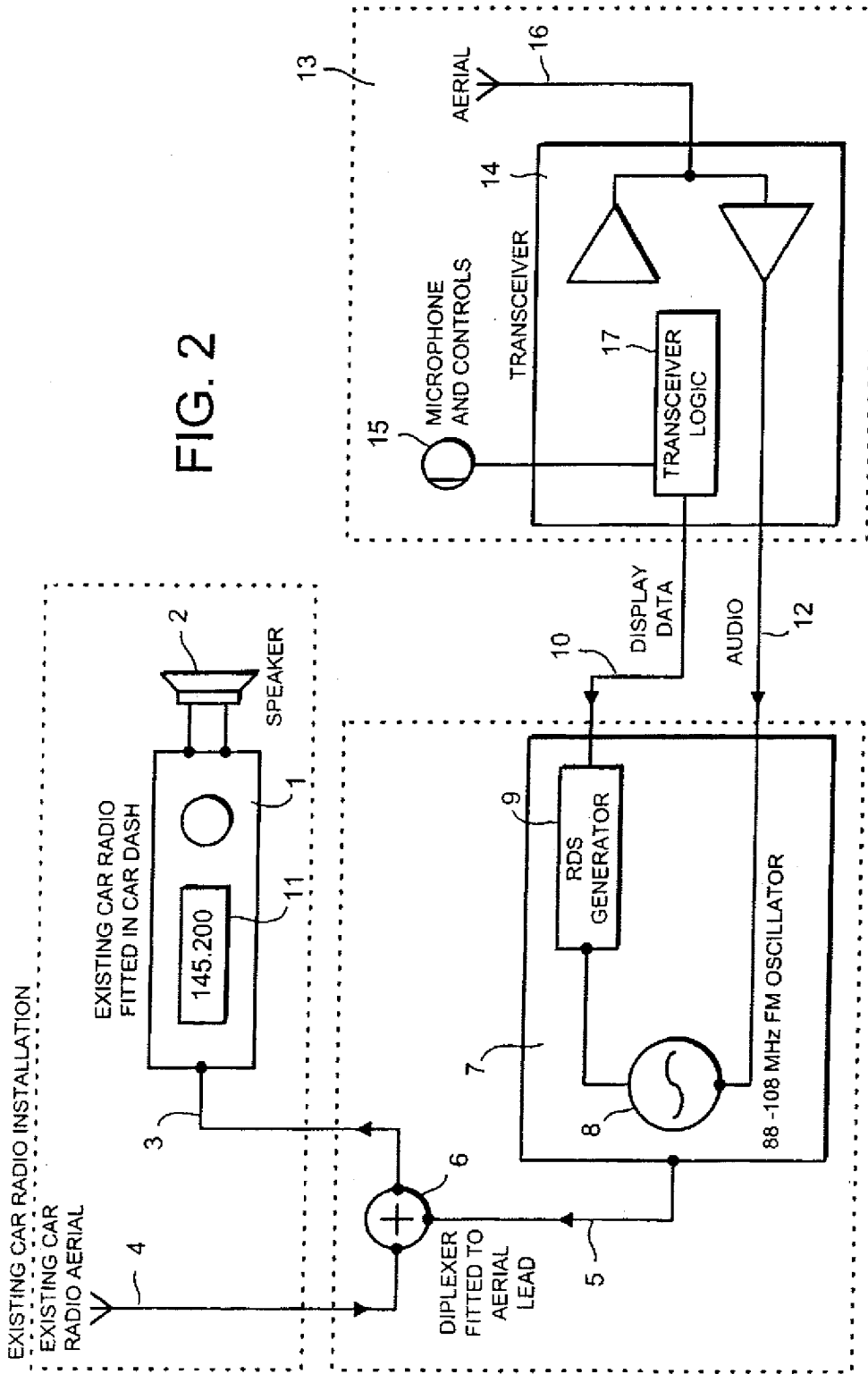


FIG. 1

FIG. 2



## TITLE

**Radio Receivers**

This invention relates to radio receivers and is more particularly  
5 concerned with improvements in or relating to radio receivers operating in the  
broadcast FM VHF band and which incorporate an arrangement whereby a  
digital data signal impressed on the transmitted carrier wave is decoded to be  
displayed on the radio receiver. Such a system is commonly called "RDS".

With VHF FM broadcasts it is customary to impress on the transmitted  
10 carrier the RDS signal which is then decoded in the radio receiver and the data  
presented, for example on the digital tuning display of the radio, in order to  
indicate the station to which the receiver is tuned or to provide other data such  
as road traffic information.

As is known, a VHF FM broadcast signal is transmitted with a pilot tone  
15 at 19 kHz serving to decode the signal to provide stereo output and in addition  
a further sub-carrier may be provided at 57 kHz on which is impressed the data  
forming the RDS signal. The RDS signal data is decoded in the receiver to  
provide information or to activate ancillary equipment.

Due to the limited frequency range of broadcast radio receivers,  
20 particularly those used in vehicles, a converter device may be used in order to  
provide for reception on other frequency bands, for example that commonly  
known as "long wave", where such receiver does not incorporate means to  
receive these frequencies directly.

The display system used particularly in a vehicle radio receiver is  
25 complex and provides a visual display not only of the tuned frequency but other

data which may be sent via the RDS signal.

It is one of the objects of this invention to provide a method and an apparatus whereby digital data may be created, encoded and subsequently fed to a broadcast receiver whereby such data may be presented on the radio receiver display panel.

In accordance with this invention there is provided apparatus for use with a broadcast radio receiver, more particularly an FM receiver, which incorporates a so-called RDS decoder and for display of alphanumeric data, the apparatus comprising a means for coupling into the aerial input of the broadcast receiver, preferably using a directional coupler, and having an input for the existing aerial and a second input coupled to a radio frequency generator operating within the frequency range of the broadcast receiver and providing a radio frequency signal compatible with and selectively tuneable by the radio receiver, the radio frequency generator incorporating means to produce an encoded sub-carrier on the output signal and carrying data which may be decoded for display on the broadcast receiver, the RDS generator having a signal input by which data which is to be displayed may be fed.

In one practical embodiment of this invention a converter device may be provided whereby signals in the long wave band are converted to a frequency in the FM broadcast waveband and fed to the aerial of an FM broadcast receiver.

Signals will be modulated onto an FM carrier frequency to which the broadcast receiver is tuned, this conveniently being a frequency otherwise vacant. An apparatus according to this invention may be incorporated into the converter device whereby a pre-programmed data input to the generator is provided such that a suitable display appropriate to the long wave signal will be impressed on

the carrier output to be decoded by the FM broadcast receiver.

In an alternative embodiment the generator may be fed with a data signal from another source such as a radio telephone system or transceiver whereby data relating to such additional apparatus may be displayed on the broadcast receiver and where this is installed in a vehicle, such display will conveniently be within the visual range of the driver. Thus, and according to this invention, the standard alphanumeric display on a mobile VHF FM broadcast radio may be used for other purposes to display data to the driver.

With such an apparatus according to this invention, data relating to the condition or operational state of the vehicle can be displayed including lighting systems as well as information relating to the time and duration of an attempted theft where this has triggered an alarm device. The frequency and mode of operation of other radio transceiving equipment may also be displayed and in addition suitable audio or visual means may be activated to attract the attention of the vehicle occupants.

In another embodiment this invention provides for data signals derived from weight sensors to be displayed thus providing an on-board weighing system.

Although this invention is primarily directed to the feeding of a signal into the aerial input of the broadcast receiver, it is to be understood that the invention also embraces an arrangement whereby the signal is fed directly to a suitable stage in the receiver or directly to the RDS decoder, possibly overriding any existing received signal to provide priority of indication on the broadcast receiver display. This invention therefore also embraces a broadcast receiver incorporating an apparatus according to this invention and with a suitable input

through which data to be displayed may be fed from external equipment or apparatus.

Another feature according to this invention provides for audio information to be impressed on the generated signal whereby this is passed through the broadcast receiver audio channels. This arrangement would then permit additional equipment such as radio telephone apparatus to be securely and remotely mounted with the broadcast receiver providing the means for display and audio output.

This invention is further described and illustrated with reference to the accompanying drawings showing one embodiment by way of example.

Referring to the drawings:

Figure 1 shows schematically the arrangement of a standard FM broadcast signal on the VHF band with stereo and RDS sub-carrier signals, and

Figure 2 shows schematically one arrangement of an apparatus according to this invention.

Referring firstly to Figure 1 of the drawings, this illustrates schematically an FM stereo broadcast where the sum of the left and right channels are contained within the usual bandwidth of the FM signal and with a pilot tone carrier at 19 kHz which serves to decode and provide a stereo difference signal which is then used to separate left and right channels. The carrier also contains a second sub-carrier at 57 kHz which is encoded with data forming the RDS signal and which is decoded in the broadcast receiver to provide display information relating to various parameters such as the station which is currently tuned on the receiver.

Figure 2 shows one arrangement according to this invention and relating to an FM VHF broadcast radio 1 fitted to the dashboard of a vehicle (not shown) and having an audio output speaker 2 and an aerial input 3 connected normally to a vehicle radio aerial 4. The apparatus according to this invention generates an FM signal within the appropriate frequency band and this is conveniently coupled through line 5 and directional coupler 6 in series with the feed from the vehicle aerial 4 to the radio aerial input 3. The directional coupler 6 ensures that the signal at 5 is not radiated through the aerial 4. The frequency used by the generator will conveniently be a vacant frequency within the FM broadcast band to which the receiver 1 may be tuned or as an alternative, automatic switching means could be provided to automatically tune receiver 1 when a signal is present at 5.

The radio frequency signal is generated in a device 7 having an oscillator 8 generating a signal within the required band, for example 88 to 108 MHz and the oscillator is modulated with a conventional FM signal through a generator 9 which may be programmed or supplied with a signal at input 10 to appropriately modulate the RDS sub-carrier applied to the oscillator. The generator 9 will thus decode data fed through input 10 and then impress this in suitable form onto the RDS signal carrier whereby the information may be subsequently decoded in receiver 1 and displayed on the receiver at 11.

In addition the generator 7 may incorporate an audio input line 12 whereby audio signals can be impressed on the oscillator 8 in order to provide suitable audio output from speaker 2.

Figure 2 also shows a radio transceiver installation schematically as 13 which includes a transceiver 14, a microphone input and control module 15 and

an aerial system 16. Customarily available transceivers incorporate a logic circuit 17 by which data normally displayed on the transceiver front panel is encoded into digital format and this may be coupled via the line 10 to the generator unit 7 whereby such data is then displayed on the panel 11 of broadcast receiver 1. In addition, the audio output from the transceiver may be passed via the audio input 12 to the oscillator.

Using this arrangement the transceiver 14 may be remotely and securely mounted in a vehicle without the need for a separate digital display or audio speaker.

Advantages of the arrangement are that any newly installed equipment in a vehicle such as a transceiver would need to have access only to the existing car radio aerial input in order to display equipment settings and to be able to use the existing radio audio equipment. In use, the broadcast receiver would be tuned to the frequency of the FM oscillator 8 and the data at the input 10 and audio at the input 12 would be suitably fed to the broadcast receiver, thus avoiding any additional display device.

As well as reducing the cost of additional equipment, safety is improved as broadcast radio installations in vehicles are normally installed to comply with safety requirements and to provide positioning of the display panel where it is least affected by ambient lighting. Thus, traditional equipment installed in the vehicle may make use of the optimum display position of the existing broadcast radio display.

**CLAIMS:**

1. An apparatus for use with a broadcast radio receiver which incorporates a decoder for display of alphanumeric data, the apparatus comprising a means  
5 for coupling into the aerial input of the broadcast receiver and having an input for the existing aerial and a second input coupled to a radio frequency generator operating within the frequency range of the broadcast receiver and providing a radio frequency signal compatible with and selectively tuneable by the radio receiver, the radio frequency generator incorporating means to  
10 produce an encoded sub-carrier on the output signal and carrying data which may be decoded for display on the broadcast receiver, the generator having a signal input by which data which is to be displayed may be fed.
2. An apparatus according to claim 1, wherein a converter device may be provided whereby signals in another frequency band, preferably the long wave  
15 band, are converted to a frequency in the broadcast receiver band and fed to the aerial of said broadcast receiver.
3. An apparatus in accordance with claim 1 or 2 wherein the broadcast receiver is an FM broadcast receiver, which incorporates an RDS decoder for display of alphanumeric data,
- 20 4. An apparatus according to claim 1, 2 or 3, wherein signals are modulated onto an FM carrier frequency to which the broadcast receiver is tuned.
5. An apparatus according to claim 3 or 4, wherein the converter device has pre-programmed therein data which is fed to the generator such that a  
25 suitable display appropriate to the other frequency band will be impressed on

the carrier output to be decoded by the FM broadcast receiver and displayed.

6. An apparatus according to any preceding claim, wherein the generator may be fed with a data signal from another source such as a radio telephone system or transceiver whereby data relating to such additional apparatus may  
5 be displayed on the broadcast receiver.
7. Apparatus in accordance with any preceding claim, wherein the standard alphanumeric display on a mobile VHF FM is used to display the decoded data.
8. Apparatus according to any preceding claim and modified wherein the signal is fed directly to a suitable stage in the receiver or directly to the RDS  
10 decoder, and preferably overriding any existing received signal, to provide priority of indication on the broadcast receiver display.
9. An apparatus in accordance with any preceding claim, wherein audio information from external apparatus, such as radio telephone apparatus, is impressed on the generated signal whereby this is passed through the  
15 broadcast receiver audio channels.
10. An apparatus according to any preceding claim, wherein the coupling means to the aerial input comprises a directional coupler.
11. A broadcast radio receiver incorporating the apparatus according to any preceding claim.
- 20 12. An apparatus substantially as described herein and exemplified with reference to the drawings.
13. A radio receiver installation incorporating an apparatus as described herein and exemplified with reference to the drawings.



Application No: GB 9926756.9  
Claims searched: 1-13

Examiner: Keith Sylvan  
Date of search: 29 March 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): H3Q (QBMX,QBMA,QRDS,QLX) H4L (LDA,LEUF,LECY)

Int Cl (Ed.7): H03J (1/00) H04B (1/18,1/20)

Other: Online: WPI,EPODOC,PAJ

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB2264613 A Pioneer. See page 11 line 16 to page 12 line 15.	-
A, P	EP0920170 A2 Nokia. See figure 6 and paragraph 37.	-
A	EP0517237 A2 Elettronica Industriale. See figure 1 and column 4 line 54 to column 5 line 7.	-
A	WO 96/32783 A1 Mold-Tech Plastics. See figure 9 and page 29 line 21 to page 31 line 9.	-
A,P	DE19806430 A1 Weinrich. See the figure and the WPI abstract.	-

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.

E Patent document published on or after, but with priority date earlier than, the filing date of this application